

REVISIONS																			
LTR	DESCRIPTION	DATE (YR-MO-DA)	APPROVED																
A	Table I, PSRR, change maximum limit from 0.004%FSR/%VS to 0.006%FSR/%VS. Table I, tests: LE, DLE, UOE, BOE, V <sub>ERR, FTE, I<sub>OUT</sub></sub> , and PSRR, change subgroups 1, 2, 3, to 4, 5, 6. Table I, I <sub>REF</sub> and SL, change subgroups 1 and 4 to 7 and 9 respectively. Change figure 1 case outline dimensioning to symbols and table format. Update drawing boilerplate.	02-07-22	Raymond Monnin																
<p>THE FIRST PAGE OF THE DRAWING HAS BEEN REPLACED.</p>																			

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REV STATUS				REV		A	A	A	A	A	A	A	A	A	A	A	A		
OF SHEETS				SHEET		1	2	3	4	5	6	7	8	9	10	11	12		
PMIC N/A				PREPARED BY Donald R. Osborne					<b>DEFENSE SUPPLY CENTER COLUMBUS</b> <b>POST OFFICE BOX 3990</b> <b>COLUMBUS, OHIO 43216-5000</b> <a href="http://www.dscc.dla.mil">http://www.dscc.dla.mil</a>										
<b>STANDARD MICROCIRCUIT DRAWING</b>  THIS DRAWING IS AVAILABLE FOR USE BY ALL DEPARTMENTS AND AGENCIES OF THE DEPARTMENT OF DEFENSE  AMSC N/A				CHECKED BY Robert M. Heber															
				APPROVED BY William K. Heckman															
				DRAWING APPROVAL DATE 90-02-28					SIZE A		CAGE CODE <b>67268</b>		<b>5962-89528</b>						
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## 1. SCOPE

1.1 Scope. This drawing describes device requirements for class H hybrid microcircuits to be processed in accordance with MIL-PRF-38534 and a choice of case outlines and lead finishes are available and are reflected in the Part or Identifying Number (PIN).

1.2 PIN. The PIN shall be as shown in the following example:

<u>5962-89528</u>	<u>01</u>	<u>X</u>	<u>X</u>
Drawing number	Device type (see 1.2.1)	Case outline (see 1.2.2)	Lead finish (see 1.2.3)

1.2.1 Device type(s). The device type(s) identify the circuit function as follows:

<u>Device type</u>	<u>Generic number</u>	<u>Circuit function</u>
01	DAC-HKB	D/A converter, 12-bit binary input code
02	DAC-HKB-2	D/A converter, 12-bit two's compliment

1.2.2 Case outline(s). The case outline(s) are as designated in MIL-STD-1835 and as follows:

<u>Outline letter</u>	<u>Descriptive designator</u>	<u>Terminals</u>	<u>Package style</u>
X	See figure 1	24	Dual-in-line

1.2.3 Lead finish. The lead finish shall be as specified in MIL-PRF-38534.

## 1.3 Absolute maximum ratings. 1/

Positive supply voltage ( $V_{CC}$ ).....	-0.3 V to +18 V dc
Negative supply voltage ( $V_{EE}$ ) .....	+0.3 V to -18 V dc
Logic supply voltage ( $V_{DD}$ ).....	-0.3 V to +7 V dc
Analog output voltage.....	$\pm V_S$
Output current .....	$\pm 20$ mA
Digital inputs .....	+5.5 V dc
Junction temperature ( $T_J$ ) .....	+175°C
Storage temperature .....	-65°C to +150°C
Lead temperature (soldering, 10 seconds).....	+300°C
Power dissipation ( $P_D$ ).....	1.35 W
Thermal resistance:	
Junction-to-case ( $\theta_{JC}$ ) .....	12°C/W
Junction-to-ambient ( $\theta_{JA}$ ) .....	49°C/W

## 1.4 Recommended operating conditions.

Positive supply voltage range ( $V_{CC}$ ) .....	+14.5 V dc to +15.5 V dc
Negative supply voltage range ( $V_{EE}$ ) .....	-14.5 V dc to -15.5 V dc
Logic supply voltage range ( $V_{DD}$ ) .....	+4.5 V dc to +5.5 V dc
Write pulse width.....	50 ns minimum
Data setup time .....	50 ns minimum
Data hold time .....	20 ns minimum
Ambient operating temperature range ( $T_A$ ) .....	-55°C to +125°C

1/ Stresses above the absolute maximum ratings may cause permanent damage to the device. Extended operation at the maximum levels may degrade performance and affect reliability.

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## 2. APPLICABLE DOCUMENTS

2.1 Government specification, standards, and handbooks. The following specification, standards, and handbooks form a part of this drawing to the extent specified herein. Unless otherwise specified, the issues of these documents are those listed in the issue of the Department of Defense Index of Specifications and Standards (DoDISS) and supplement thereto, cited in the solicitation.

### SPECIFICATION

#### DEPARTMENT OF DEFENSE

MIL-PRF-38534 - Hybrid Microcircuits, General Specification for.

### STANDARDS

#### DEPARTMENT OF DEFENSE

MIL-STD-883 - Test Method Standard Microcircuits.

MIL-STD-1835 - Interface Standard Electronic Component Case Outlines.

### HANDBOOKS

#### DEPARTMENT OF DEFENSE

MIL-HDBK-103 - List of Standard Microcircuit Drawings.

MIL-HDBK-780 - Standard Microcircuit Drawings.

(Unless otherwise indicated, copies of the specification, standards, and handbooks are available from the Standardization Document Order Desk, 700 Robbins Avenue, Building 4D, Philadelphia, PA 19111-5094.)

2.2 Order of precedence. In the event of a conflict between the text of this drawing and the references cited herein, the text of this drawing takes precedence. Nothing in this document, however, supersedes applicable laws and regulations unless a specific exemption has been obtained.

## 3. REQUIREMENTS

3.1 Item requirements. The individual item performance requirements for device class H shall be in accordance with MIL-PRF-38534. Compliance with MIL-PRF-38534 may include the performance of all tests herein or as designated in the device manufacturer's Quality Management (QM) plan or as designated for the applicable device class. Therefore, the tests and inspections herein may not be performed for the applicable device class (see MIL-PRF-38534). Furthermore, the manufacturers may take exceptions or use alternate methods to the tests and inspections herein and not perform them. However, the performance requirements as defined in MIL-PRF-38534 shall be met for the applicable device class.

3.2 Design, construction, and physical dimensions. The design, construction, and physical dimensions shall be as specified in MIL-PRF-38534 and herein.

3.2.1 Case outline(s). The case outline(s) shall be in accordance with 1.2.2 herein and figure 1.

3.2.2 Terminal connections. The terminal connections shall be as specified on figure 2.

3.2.3 Functional diagram. The functional diagram data shall be as specified on figure 3.

3.2.4 Truth tables. The truth tables data shall be as specified on figure 4.

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3.3 Electrical performance characteristics. Unless otherwise specified herein, the electrical performance characteristics are as specified in table I and shall apply over the full specified operating temperature range.

3.4 Electrical test requirements. The electrical test requirements shall be the subgroups specified in table II. The electrical tests for each subgroup are defined in table I.

3.5 Marking of device(s). Marking of device(s) shall be in accordance with MIL-PRF-38534. The device shall be marked with the PIN listed in 1.2 herein. In addition, the manufacturer's vendor similar PIN may also be marked.

3.6 Data. In addition to the general performance requirements of MIL-PRF-38534, the manufacturer of the device described herein shall maintain the electrical test data (variables format) from the initial quality conformance inspection group A lot sample, for each device type listed herein. Also, the data should include a summary of all parameters manually tested, and for those which, if any, are guaranteed. This data shall be maintained under document revision level control by the manufacturer and be made available to the preparing activity (DSCC-VA) upon request.

3.7 Certificate of compliance. A certificate of compliance shall be required from a manufacturer in order to supply to this drawing. The certificate of compliance (original copy) submitted to DSCC-VA shall affirm that the manufacturer's product meets the performance requirements of MIL-PRF-38534 and herein.

3.8 Certificate of conformance. A certificate of conformance as required in MIL-PRF-38534 shall be provided with each lot of microcircuits delivered to this drawing.

#### 4. QUALITY ASSURANCE PROVISIONS

4.1 Sampling and inspection. Sampling and inspection procedures shall be in accordance with MIL-PRF-38534 or as modified in the device manufacturer's Quality Management (QM) plan. The modification in the QM plan shall not affect the form, fit, or function as described herein.

4.2 Screening. Screening shall be in accordance with MIL-PRF-38534. The following additional criteria shall apply:

a. Burn-in test, method 1015 of MIL-STD-883.

(1) Test condition A, B, C, or D. The test circuit shall be maintained by the manufacturer under document revision level control and shall be made available to either DSCC-VA or the acquiring activity upon request. Also, the test circuit shall specify the inputs, outputs, biases, and power dissipation, as applicable, in accordance with the intent specified in test method 1015 of MIL-STD-883.

(2)  $T_A$  as specified in accordance with table I of method 1015 of MIL-STD-883.

b. Interim and final electrical test parameters shall be as specified in table II herein, except interim electrical parameter tests prior to burn-in are optional at the discretion of the manufacturer.

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TABLE I. Electrical performance characteristics.

Test	Symbol	Conditions 1/ -55°C ≤ T <sub>A</sub> ≤ +125°C unless otherwise specified	Group A subgroups	Device type	Limits		Unit
					Min	Max	
Resolution	RES	Binary input code	1, 2, 3	01	12		Bits
		Two's complement input code		02	12		
Linearity error	LE	Major sums, carries	4	All		0.5	LSB
			5, 6			0.75	
Differential linearity error	DLE	Monotonic over temperature	4	All		0.75	LSB
			5, 6			1.0	
Gain error	GE	V <sub>O</sub> = +FS, +10 V and ±10 V FSR	4	All		0.1	%FSR
			5, 6			0.2	
Unipolar offset error	UOE	V <sub>O</sub> = 0 V, ±10 V range	4	All		0.05	%FSR
			5, 6			0.1	
Bipolar offset error	BOE	V <sub>O</sub> = -10 V, ±10 V range	4	All		0.1	%FSR
			5, 6			0.2	
Reference error	V <sub>ERR</sub>	V <sub>REF</sub> = -6.300 V	4	All	6.23	6.37	V
			5, 6		6.218	6.382	
Reference current	I <sub>REF</sub>	For external use, T <sub>A</sub> = +25°C 2/	7	All	2		mA
Slew rate 2/	SL	10 V step, T <sub>A</sub> = +25°C	9	All	10		V/μs
Settling time 2/	t <sub>s</sub>	20 V step to 0.01% FSR 10 V step to 0.01% FSR 5 V step to 0.01% FSR 1 LSB step to 0.01% FSR T <sub>A</sub> = +25°C	9	All		4 3 3 800	μs
DC feedthrough error	FTE	Latch at +FS change	4, 5, 6	All		1	mV
Functional test		See 4.3.1.c, T <sub>A</sub> = +25°C	7	All			

See footnotes at end of table.

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TABLE I. Electrical performance characteristics - Continued.

Test	Symbol	Conditions <sup>1/</sup> -55°C ≤ T <sub>A</sub> ≤ +125°C unless otherwise specified	Group A subgroups	Device type	Limits		Unit
					Min	Max	
Output current	I <sub>OUT</sub>	±10 V FSR, R <sub>L</sub> = 1.9 kΩ	4, 5, 6	All	±5		mA
Power supply rejection ratio	PSRR	Worst case, V <sub>S</sub> = ±5 V	4, 5, 6	All		0.006	%FSR/ %VS
Power supply current	I <sub>CC</sub>	V <sub>CC</sub> = +15.5 V	1, 2, 3	All		+17	mA
	I <sub>EE</sub>	V <sub>EE</sub> = -15.5 V				-25	
	I <sub>DD</sub>	V <sub>DD</sub> = +5.5 V				+50	
Power dissipation	P <sub>D</sub>	V <sub>S</sub> = ±15.5 V, +5.5 V	1, 2, 3	All		926	mW
Digital input voltage high	V <sub>IH</sub>	I <sub>IH</sub> = -40 μA	1, 2, 3	All	2.0		V
Digital input voltage low	V <sub>IL</sub>	I <sub>IL</sub> = +2.4 mA	1, 2, 3	All		0.8	V
Digital input current high	I <sub>IH</sub>	V <sub>IH</sub> = +2.0 V	1, 2, 3	All		-40	μA
Digital input current low	I <sub>IL</sub>	V <sub>IL</sub> = +0.8 V	1, 2, 3	All		2.4	mA
Strobe input current high	I <sub>SIH</sub>	V <sub>SIH</sub> = 2.0 V	1, 2, 3	All		-120	μA
Strobe input current low	I <sub>SIL</sub>	V <sub>SIL</sub> = 0.8 V	1, 2, 3	All		4.8	mA

<sup>1/</sup> Unless otherwise specified, the following conditions apply:

V<sub>CC</sub> = +15 V, V<sub>EE</sub> = -15 V, V<sub>DD</sub> = +5 V dc.

Logic "0" = +0.8 V dc, logic "1" = 2.0 V dc.

VFSR = 20 V

Bipolar operation, no load applied, using internal reference.

<sup>2/</sup> If more than 10 μA is drawn externally, the reference temperature coefficient will increase resulting in a proportional change in the gain and bipolar offset performance.

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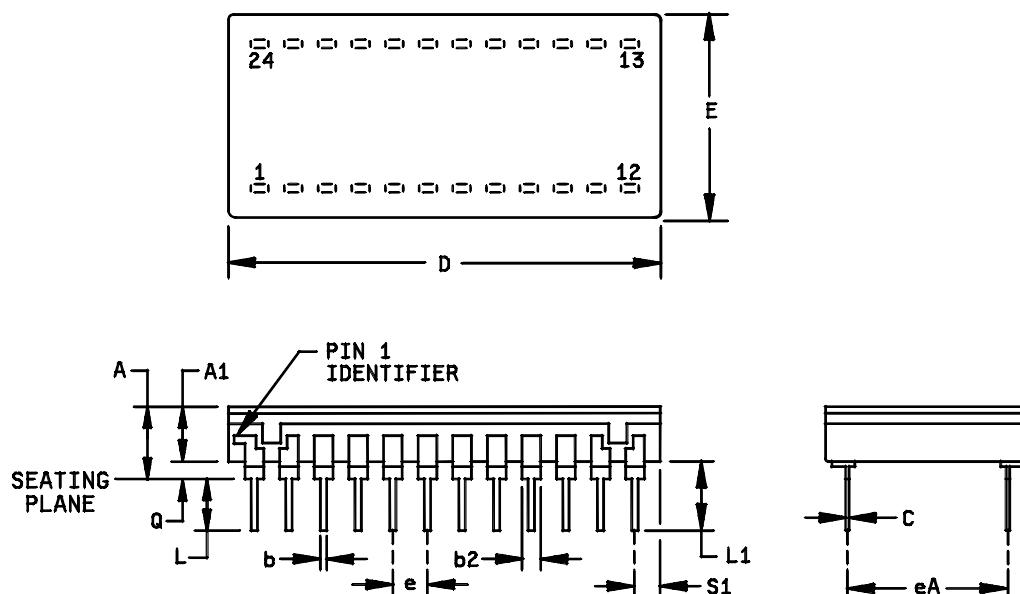
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Case outline X.



Symbol	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	----	5.99	----	0.236
A1	3.05	4.32	0.120	0.170
b	0.41	0.56	0.016	0.022
b2	0.89	1.14	0.035	0.045
c	0.23	0.38	0.009	0.015
D	32.38	35.18	1.275	1.385
E	19.56	21.09	0.770	0.830
eA	14.99	15.49	0.590	0.610
e	2.54 BSC		0.100 BSC	
L	4.06	5.46	0.160	0.215
L1	4.70	6.35	0.185	0.250
Q	0.38	1.14	0.015	0.045
S1	2.16	3.18	0.085	0.125

NOTES:

1. The U.S. preferred system of measurement is the metric SI. This item was designed using inch-pound units of measurement. In case of problems involving conflicts between the metric and inch-pound units, the inch-pound units shall rule.
2. Pin numbers are for reference only.

FIGURE 1. Case outline(s).

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Device types	All		
Case outline	X		
Terminal number	Terminal symbol	Terminal number	Terminal symbol
1	Bit 1 (MSB)	13	$V_{DD}$
2	Bit 2	14	$V_{EE}$
3	Bit 3	15	Output
4	Bit 4	16	Load
5	Bit 5	17	Bipolar offset
6	Bit 6	18	10 V range
7	Bit 7	19	20 V range
8	Bit 8	20	Sum junction
9	Bit 9	21	Ground
10	Bit 10	22	$V_{CC}$
11	Bit 11	23	Gain
12	Bit 12 (LSB)	24	Reference output

FIGURE 2. Terminal connections.

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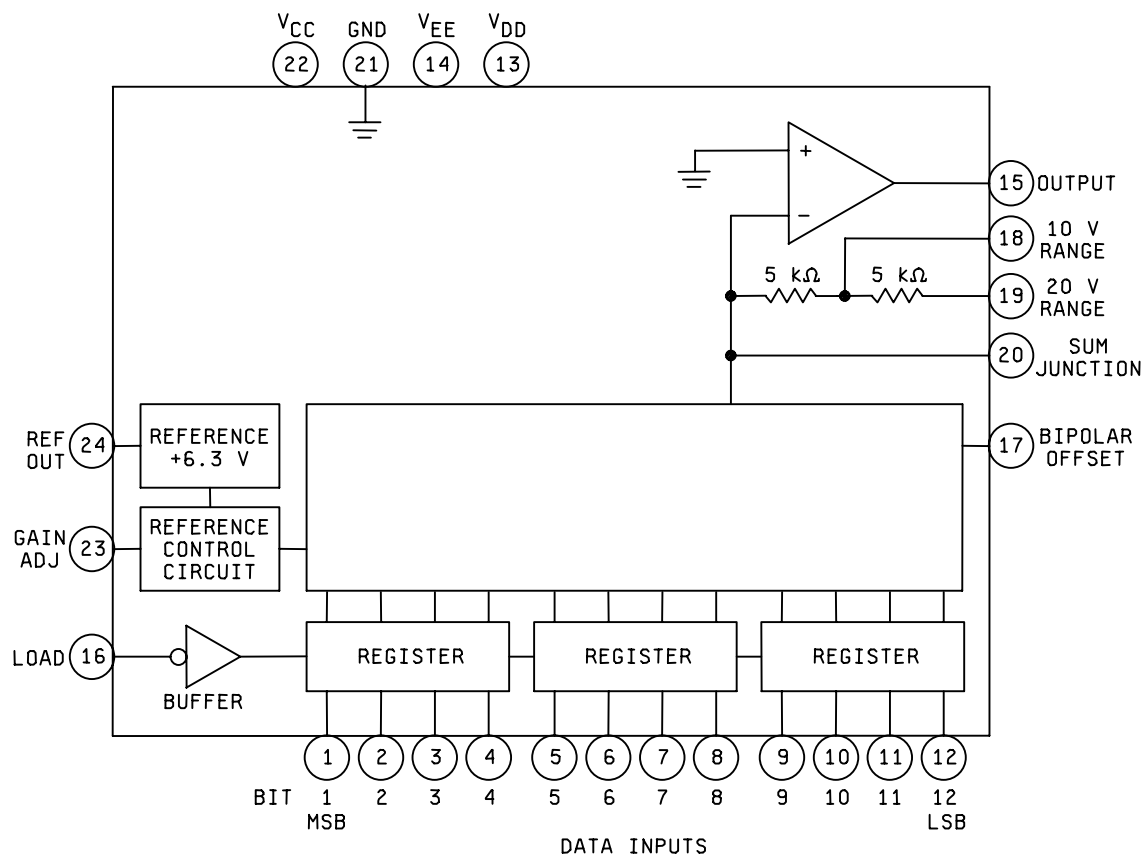


FIGURE 3. Functional diagram.

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Bipolar operation

Device type 01		Device type 02		Output ranges		
MSB	LSB	MSB	LSB	±10 V	±5 V	±2.5 V
1111 1111 1111		0111 1111 1111		+9.9951	+4.9976	+2.4988
1100 0000 0000		0100 0000 0000		+5.0000	+2.5000	+1.2500
1000 0000 0000		0000 0000 0000		0.0000	0.0000	0.0000
0100 0000 0000		1100 0000 0000		-5.0000	-2.5000	-1.2500
0000 0000 0001		1000 0000 0001		-9.9951	-4.9976	-2.4988
0000 0000 0000		1000 0000 0000		-10.0000	-5.0000	-2.5000

Unipolar operation

All device types		Output ranges	
MSB	LSB	0 V to +10 V	0 V to +5 V
1111 1111 1111		+9.9976	+4.9988
1100 0000 0000		+7.5000	+3.7500
1000 0000 0000		+5.0000	+2.5000
0100 0000 0000		+2.5000	+1.2000
0000 0000 0001		+0.0024	+0.0012
0000 0000 0000		0.0000	0.0000

FIGURE 4. Truth tables.

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TABLE II. Electrical test requirements.

MIL-PRF-38534 test requirements	Subgroups (in accordance with MIL-PRF-38534, group A test table)
Interim electrical parameters	1
Final electrical parameters	1*,2,3,4,5,6,7,9
Group A test requirements	1,2,3,4,5,6,7,9
Group C end-point electrical parameters	1

\* PDA applies to subgroup 1.

4.3 Conformance and periodic inspections. Conformance inspection (CI) and periodic inspection (PI) shall be in accordance with MIL-PRF-38534 and as specified herein.

4.3.1 Group A inspection (CI). Group A inspection shall be in accordance with MIL-PRF-38534 and as follows:

- a. Tests shall be as specified in table II herein.
- b. Subgroups 8, 10, and 11 shall be omitted.
- c. Subgroup 7 shall include verification of the truth table.

4.3.2 Group B inspection (PI). Group B inspection shall be in accordance with MIL-PRF-38534.

4.3.3 Group C inspection (PI). Group C inspection shall be in accordance with MIL-PRF-38534 and as follows:

- a. End-point electrical parameters shall be as specified in table II herein.
- b. Steady-state life test, method 1005 of MIL-STD-883.
  - (1) Test condition A, B, C, or D. The test circuit shall be maintained by the manufacturer under document revision level control and shall be made available to either DSCC-VA or the acquiring activity upon request. Also, the test circuit shall specify the inputs, outputs, biases, and power dissipation, as applicable, in accordance with the intent specified in test method 1005 of MIL-STD-883.
  - (2)  $T_A$  as specified in accordance with table I of method 1005 of MIL-STD-883.
  - (3) Test duration: 1,000 hours, except as permitted by method 1005 of MIL-STD-883.

4.3.4 Group D inspection (PI). Group D inspection shall be in accordance with MIL-PRF-38534.

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## 5. PACKAGING

5.1 Packaging requirements. The requirements for packaging shall be in accordance with MIL-PRF-38534.

## 6. NOTES

6.1 Intended use. Microcircuits conforming to this drawing are intended for use for Government microcircuit applications (original equipment), design applications, and logistics purposes.

6.2 Replaceability. Microcircuits covered by this drawing will replace the same generic device covered by a contractor-prepared specification or drawing.

6.3 Configuration control of SMD's. All proposed changes to existing SMD's will be coordinated with the users of record for the individual documents. This coordination will be accomplished in accordance with MIL-PRF-38534.

6.4 Record of users. Military and industrial users shall inform Defense Supply Center Columbus when a system application requires configuration control and the applicable SMD. DSCC will maintain a record of users and this list will be used for coordination and distribution of changes to the drawings. Users of drawings covering microelectronic devices (FSC 5962) should contact DSCC-VA, telephone (614) 692-0544.

6.5 Comments. Comments on this drawing should be directed to DSCC-VA, Post Office Box 3990, Columbus, Ohio 43216-5000, or telephone (614) 692-0536.

6.6 Sources of supply. Sources of supply are listed in MIL-HDBK-103 and QML-38534. The vendors listed in MIL-HDBK-103 and QML-38534 have submitted a certificate of compliance (see 3.7 herein) to DSCC-VA and have agreed to this drawing.

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## STANDARD MICROCIRCUIT DRAWING BULLETIN

DATE: 02-07-22

Approved sources of supply for SMD 5962-89528 are listed below for immediate acquisition information only and shall be added to MIL-HDBK-103 and QML-38534 during the next revisions. MIL-HDBK-103 and QML-38534 will be revised to include the addition or deletion of sources. The vendors listed below have agreed to this drawing and a certificate of compliance has been submitted to and accepted by DSCC-VA. This bulletin is superseded by the next dated revisions of MIL-HDBK-103 and QML-38534.

Standard microcircuit drawing PIN <u>1/</u>	Vendor CAGE number	Vendor similar PIN <u>2/</u>
5962-8952801XA 5962-8952801XC	50721 50721	DAC-HKB/883 DAC-HKB/883
5962-8952802XA 5962-8952802XC	50721 50721	DAC-HKB-2/883 DAC-HKB-2/883

- 1/ The lead finish shown for each PIN representing a hermetic package is the most readily available from the manufacturer listed for that part. If the desired lead finish is not listed contact the Vendor to determine its availability.
- 2/ Caution. Do not use this number for item acquisition. Items acquired to this number may not satisfy the performance requirements of this drawing.

Vendor CAGE  
number

50721

Vendor name  
and address

Datel, Incorporated  
11 Cabot Boulevard  
Mansfield, MA 02048-1151

The information contained herein is disseminated for convenience only and the Government assumes no liability whatsoever for any inaccuracies in the information bulletin.